

REMARKS

The Applicants have studied the Office Action dated May 2, 2008. Claims 1, 2, 3, 6, 7, 8, 10, 11, 12, 17, 21, 22, 23, 30, 31, 32, 35 and 37 have been amended. Claims 9, 15, 16, 20, 29, 33, 34 and 36 have been canceled. New claims 43-55 have been added. Support for the new claims are found in the application as originally filed, specifically in paragraphs [0065] to [0067]. No new matter has been added. After this amendment, claims 1-8, 10-14, 17-19, 21-28, 30-32, 35, 37, 38 and 40-55 remain pending. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks are respectfully requested.

In the Office Action, the Examiner:

- (2-3) rejected claims 1-15, 17-27, 37-38 and 40-42 under 35 U.S.C. §102(b) as being anticipated by Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard");
- (4-5) rejected claims 16 and 28 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Carman II (U.S. 5,454,046); and
- (6) rejected claims 29-36 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Milewski et al., ("Medical Word Recognition Using a Computational Lexicon").

(2-3) Rejection under 35 U.S.C. §102(b)

Before discussing in detail the art cited by the Examiner, it is believed that a brief review of the invention would be helpful. The present invention is directed to word pattern recognition of gestures entered on touch-screen devices such as mobile phones, handhelds and tablet computers, and other devices with keyboards. The system of the present invention supports very large vocabularies for each specific user. This technology has been licensed by IBM to a new company, ShapeWriter, Inc. A demonstration of this technology is available online at <http://www.shapewriter.com/demo.html>. As shown in FIGS. 2-8, the system

recognizes words through defined word patterns of known paths. Each of the paths connects elements of the word on the keyboard. With the Applicants' invention, the virtual keyboard contains a set of characters forming elements in the word without temporary target letters being placed adjacent to a current stroke location. The Applicants' invention captures strokes on a virtual keyboard. Next, the Applicants' invention recognizes a word pattern by selectively processing different aspect of the stroke using a combination of channels (shape, location and tunnel) in relation to paths on the keyboard. Examples are clearly shown in FIGS. 7A to 7I.

As noted above, the Examiner rejected claims 1-15, 17-27, 37-38 and 40-42 under 35 U.S.C. §102(b) as being anticipated by Kristensson. Independent claims 1, 21 and 37 have been amended to distinguish over Kristensson. Kristensson only uses a crude form of location information, the location of the bounding box of a gesture (see Section 3.5.2, "Partial Location Dependency" of Kristensson, which is a sub-section of 3.5, "Resolving Ambiguity"), as a post-processing step to disambiguate candidates with identical and or nearly identical matching scores according to normalized shape information. "Normalized shape" means all stroke are transformed to the same origin and the same size hence deliberately removing location information (see Kristensson Figure 4-4). Kristensson does not use probability estimates to do a true mathematical integration. The power of the method of Kristensson is very limited. For example, suppose A and B are two candidates and S is a stroke drawn by a user. If A and B have a same matching distance to S in shape space, but A is closer to S in location, then A can be selected in the post-processing step of Kristensson. However, if A is farther away from S than B is from S in shape space, then A will not be selected as a final top candidate, regardless if A is much closer to S than B is to S in location. On the other hand, in the Applicants' invention, shape and location each produces candidate words with different matching scores that are converted to probabilities that are later mathematically integrated into one ranked list. Using the same example above, if A is somewhat farther away to S than B is, but A is much closer to S than B is in location space, then A may still be selected as the final top candidate, depending the relative weight of the two channels. The Applicants' invention comprises a systematic method of converting matching scores to probability estimates, and then integrates them in a mathematical and probabilistic framework.

The last three steps of amended independent claim 1 recite as follows:

“processing the stroke using a combination of a plurality of channels, each channel selectively measuring a different aspect of the stroke’s similarity to the plurality of the paths on the virtual keyboard;
converting each different aspect of the stroke’s similarity to probability estimates;
mathematically integrating the probability estimates of the plurality of channels to produce integrated probability estimates of candidate words; and
ranking the word candidates in order of probability.”

Support for this amendment is found in the application as originally filed, specifically in paragraphs [0065] to [0067]. No new matter has been added. The last three steps of amended claim 1 are not taught or disclosed by Kristensson.

The Examiner cites 35 U.S.C. § 102(e) and a proper rejection requires that a single reference teach (i.e., identically describe) each and every element of the rejected claims as being anticipated by Kristensson.¹ The apparatus of Kristensson does not determine a time spent inputting the stroke; does not modify the location-based similarity probability estimate according to a path of the stroke on the virtual keyboard and the time spent inputting the stroke, to produce an output of the one channel; and does not mathematically integrating outputs of the plurality of the channels to produce an integrated probability estimate of a candidate word. Accordingly, claim 1 distinguishes over Kristensson for at least this reason. The Applicants respectfully submitted that the Examiner’s rejection under 35 U.S.C. §102(e) has been overcome.

Regarding specifically the rejection of dependent claim 3. Kristensson discloses location information of a stroke using a “bounding box”, in which extreme points of a stroke may be determined and used, but Kristensson fails to disclose location information of a stroke

¹ See MPEP §2131 “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” [Emphasis Added] Verdegaa Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “The identical invention must be shown in as complete detail as is contained in the ... claim.”

using sampling points of the stroke that are interior of the extreme points of the stroke.

Independent claims 21 and 37 have also been amended to distinguish over Kristensson. The last three steps of amended claims 21 and 37 are not taught or disclosed by Kristensson.

Claims 2-8, 10-14 and 17-19 depend from independent claim 1, claims 22-27 depend from independent claim 21, and claims 38 and 40-42 depend from independent claim 37.

Because dependent claims contain all the limitations of the independent claims, it is believed, for at least this reason, that claims 2-8, 10-14, 17-19, 38 and 40-42, distinguish over Kristensson, as well.

With specific regard to the Examiner's rejection of claim 3, Kristensson only uses a bounding box of a gesture to determine location information. In contrast, the Applicants' invention represents location from beginning to end of the stroke with different weights.

With specific regard to the rejection of claim 4. Figure B-2 of Kristensson illustrates the trace for the word "then" inside the keys T, H, E and N. This is only coincidental (note that the figure text for Figure B-2 simply states "Notepad GUT". There is nothing in Kristensson that articulates anything to the effect of the tunnel constraint.

With specific regard to the rejection of claim 5, there is nothing in Kristensson that argues for using a language model as the term "language model" is defined in the Applicants' patent application. Further, Appendix D of Kristensson is simply a list of words and their shapes, and does not suggest, teach or disclose how to integrate language modeling information into a recognizer's metric.

With specific regard to the rejection of claim 9, the recitations that formerly appeared in cancelled claim 9 now appear in amended claim 8. Kristensson does not weight each corresponding sample point according to a weighting function. Instead, Kristensson calculates the minimal distortion (or stretching) required to transform one shape into another shape. Equations 4.10 and 4.11 of Kristensson do not constitute a weighting function for adjusting the relative importance of the stroke sample points from beginning to end.

With specific regard to the rejection of claim 14. Firstly, there is no reference in Kristensson to "morphing" or "animation" feedback wherein a user's gesture is gradually (over time) transformed into the ideal gesture. Secondly, Kristensson calculates a scalar value: the minimum spatial distance between two shapes. On the other hand, claim 14 refers to generating

an intermediate shape. The Applicants' patent application describes using linear interpolation; while in Kristensson, all shape comparisons are calculated using elastic matching. Kristensson does not disclose a user feedback mechanism. The Applicants' invention generates and displays intermediate shapes to the user. The Applicants' patent application explains that this method is useful because it enables a user to see how "sloppy" the user gestured a particular word. On the other hand, Kristensson merely discloses calculating how "close" shapes are to each other (see Chapter 4.2.2.1 in Kristensson).

With specific regard to the rejection of claim 18. Kristensson does not sample the word pattern and the gesture trace into an equal number of points. Rather, Kristensson calculates a minimum stretching distance between two point sets. The Applicants' invention does not stretch any pattern in the comparison metric. This is possible because the Applicants' invention samples both the word pattern and gesture trace into an equal number of points.

With specific regard to the rejection of claim 20, the recitations that formerly appeared in cancelled claim 20 now appear in amended claim 17. Chapter 3.7.3 of Kristensson refers to two different modes of entry: the user can either tap or the user can trace a word. On the other hand, claim 20 refers to information required to initiate the matching process.

For the reasons set forth above, and in view of the amendments to claims 1-3, 21-23 and 37, the Applicants believe that the rejection of claims 1-8, 10-14, 17-19, 21-27, 37-38 and 40-42 has been overcome.

(4-5) Rejection under 35 U.S.C. §103(a)

As noted above, the Examiner rejected claims 16 and 28 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Carman II (U.S. 5,454,046). Claim 16 was cancelled. The rejected dependent claim 28 depends upon independent claim 21, respectively, as described above in the section entitled "(2-3) Rejection under 35 U.S.C. §102(e)", have been amended to distinguish over Kristensson. Further, the Kristensson reference taken alone and/or in view of Carman II simply does not suggest, teach or disclose the patentably distinct limitations of the elements in amended independent claim 21, the last elements of which read as follows:

“a pattern recognition engine that recognizes a word pattern by processing the stroke using a combination of a plurality of channels, each channel selectively processing a different aspect of the input trace in relation to the plurality of the paths on the graphical keyboard layer, one channel of the plurality of channels processing a location-based similarity probability estimate; and

a computer for:

determining a time spent inputting the input trace,

modifying the location-based similarity probability estimate according to a path of the stroke on the virtual keyboard and the time spent inputting the input trace, to produce an output of the one channel, and

mathematically integrating outputs of the plurality of the channels to produce an integrated probability estimate of a candidate word.”

The above-quoted elements of amended independent claim 21 are not taught or disclosed by Kristensson and/or in view of Carman II.

For the foregoing reasons, amended independent claim 21 distinguishes over Kristensson taken alone and/or in view of Carman II. Furthermore, claim 28 depends from independent claim 21. Because a dependent claim contains all the limitations of the independent claims, for at least this reason claim 28 distinguishes over Kristensson taken alone and/or in view of Carman II, as well, and the Examiner’s rejection should be withdrawn.

(6) Rejection under 35 U.S.C. §103(a)

As noted above, the Examiner rejected claims 29-36 under 35 U.S.C. § 103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Milewski et al., ("Medical Word Recognition Using a Computational Lexicon").

Independent claim 21, as described above in the section entitled "(2-3) Rejection under 35 U.S.C. §102(e)", has been amended to distinguish over Kristensson.

For the foregoing reasons, amended independent claim 21 distinguishes over Kristensson taken alone and/or in view of Milewski. Claims 29, 33, 34 and 36 were cancelled. The recitations that formerly appeared in claims 29, 33, 34 and 36 now appear in amended claims 30, 31, 32 and 35. Amended claims 30, 31, 32 and 35 depend from claim 21. Because dependent claims contain all the limitations of the independent claims, 30, 31, 32 and 35 distinguish over Kristensson taken alone and/or in view of Milewski, as well, and the Examiner's rejection should be withdrawn.

Conclusion

In view of the preceding discussion, it is submitted that the claims are in condition for allowance. Allowance of claims 1-8, 10-14, 17-19, 21-28, 30-32, 35, 37, 38 and 40-55 is requested.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless the Applicants have argued herein that such amendment was made to distinguish over a particular reference or combination of references.

The Applicants acknowledge the continuing duty of candor and good faith to disclose information known to be material to the examination of this application. In accordance with 37 CFR §1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment are limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and

everything else is unforeseeable at the time of this amendment by the Applicants and their attorneys.

The present application, after entry of this response, comprises forty-six (46) claims, including five (5) independent claims. The Applicants have previously paid for forty-two (42) claims including three (3) independent claims. The Commissioner is hereby authorized to change any fees that may be required or credit any overpayment to Deposit Account **09-0441**.

PLEASE CALL the undersigned if the Examiner believes that there are any informalities that can be corrected by Examiner's amendment, or that in any way it would help expedite the prosecution of the patent application.

Respectfully submitted.

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